# REMOTE OR INDIRECT SUBPERITONEAL DRAINAGE IN THE EXTRAPERITONEAL CLOSURE OF PERSISTENT FÆCAL FISTULÆ.

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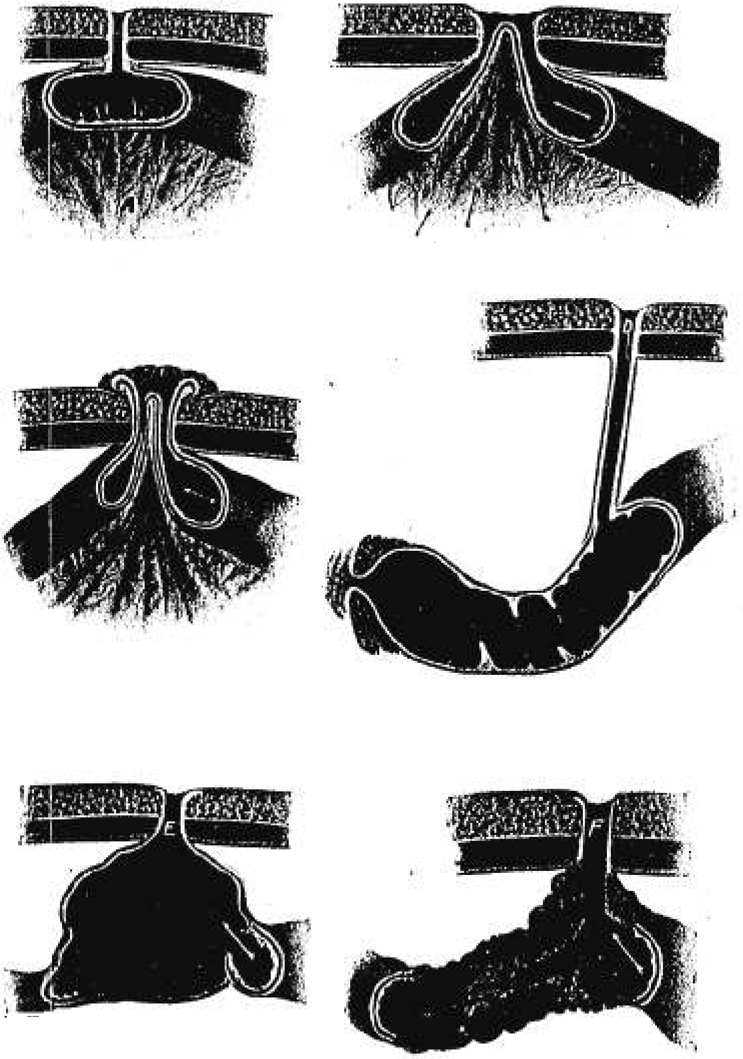
By persistent fæcal fistula, we mean one which has existed for several months without showing any tendency to heal, or, having been of short duration, presents obvious mechanical obstacles to healing. The discharge from such a fistula may vary in amount from a slight fluid discharge to the turning of the entire fæcal current through the fistula. For convenience fistulæ may be divided into five grades or types. First, those which consist of a simple granulation-lined canal which extends through the abdominal wall and communicates immediately with the lumen of an unobstructed intestine (*A*, Plate I). This variety usually heals without surgical aid or, at most, may be healed by curetting the wound thoroughly or cauterizing it. Second, that variety in which the fistula is large; the intestine is attached to the abdominal wall; the mesentery is long, and intra-abdominal pressure forces the posterior intestinal wall into or through the opening, along with its mesentery, thereby producing a hernia (*B*, Plate I.—Intra-abdominal pressure indicated by black arrows). Observed through the opening, what appears to be a tumor covered with mucous membrane presents. A probe or a pair of forceps applied reduces the hernia without resistance, but immediately it returns as the result of intra-abdominal pressure. If the posterior intestinal wall barely engages, as is shown by *B*, Plate I, we would class it as an incomplete reducible hernia. If the posterior wall comes out partly through the opening and can still be easily pushed back, we would class it as a complete reducible hernia. The incomplete reducible hernia is produced and maintained because of the opening in front of it and the intra-abdominal pressure behind. The hernia resists the normal passing of the fæcal matter along the intestine and therefore obstructs (indicated by white arrow) to an extent proportionate to the size and completeness of the hernia. If the wound rapidly contracts, thus offering some resistance at the outlet, the intra-abdominal pressure proportionately becomes weaker as the opening gets smaller until the hernia is overcome by the fæcal current, and the fistula which remains is reduced to type (*A*, Plate I) which finally heals spontaneously. If the opening of the reducible incomplete hernia, by retraction of muscles or for other reasons, remains large for a long time, this hernia gradually becomes fixed by union of the peritoneal surfaces on the mesenteric border of the intestine. This, then, becomes an incomplete irreducible hernia and is called a spur. If we have a complete reducible hernia in which the posterior intestinal walls become actually engaged in the fistulous opening and are allowed to remain in that position for any length of time, the pressure of the cicatrizing wound gripping the hernia causes a blending of the peritoneal surfaces included in the hernia, and forms a complete irreducible hernia which turns a large portion, if not all, of the fæcal matter through the fistula and is practically an artificial anus. This kind of a fistula always demands surgical aid. This kind of a hernia is also called a spur. Then a spur may be defined as an irreducible hernia of the posterior intestinal wall with its mesentery and may be complete or incomplete.

Mikulicz suggested that a spur might be the result of peristaltic action, pulling away the afferent and efferent loops of the intestine from the point fixed to the abdominal wall, until they paralleled each other (von Bergman-Bull, System of Surgery). However, it is probable that this only happens after the fistula becomes so small that intra-abdominal pressure ceases to force the posterior intestinal wall out through it.

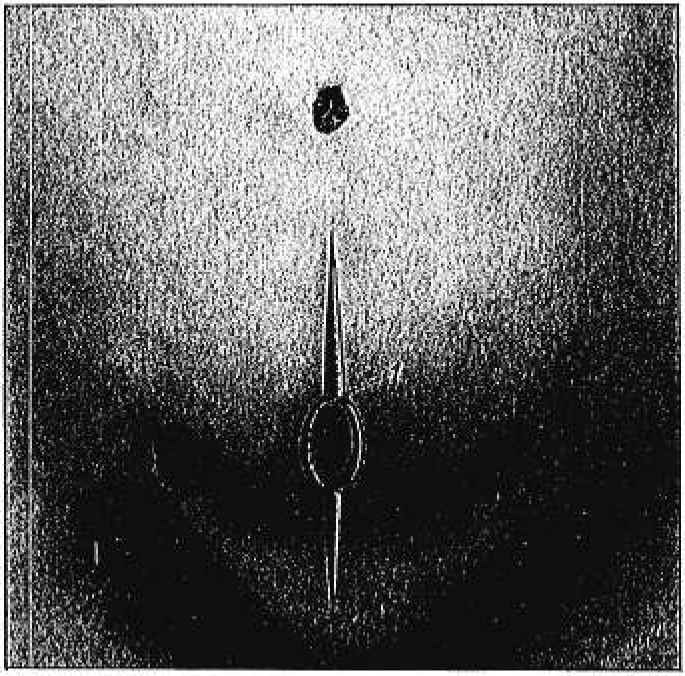
*C*, Plate I, represents an artificial anus which is a complete irreducible hernia from the beginning, and which has been deliberately produced. In this case a definite spur is formed as soon as the wound has had time to contract. In this

PLATE I.



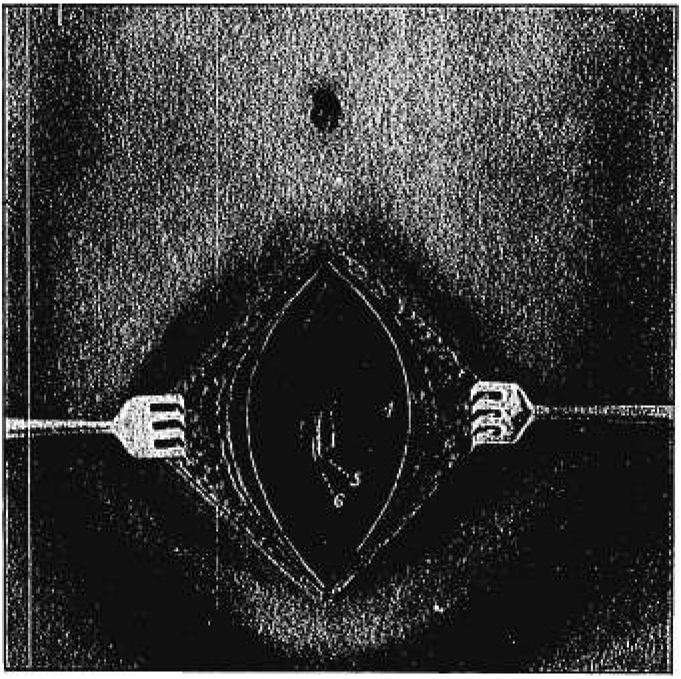
Types of fæcal fistulæ.—*A*, Simplest form. *B*, Spur formation or reducible hernia type. *C*, Artificial anus or irreducible hernia. *D*, Fistula leading to intestine remote from abdominal wall. *E*, Fistula leading to large cavity resulting from gangrene due to mesenteric embolism. *F*, Fistula leading to intestine above cancer.

PLATE II.



Skin incision.—1, Incision through skin, forming long wound, and surrounding the fistula.

PLATE III.



Wound dissected and layers separated ready for suturing.—2, Dissect fat off the fascia for two inches away from the wall. 3, Separate fascia from muscle. 4, Dissect the peritoneum away from the muscle for two inches on every side. 5, Remove margin of skin around fistula which has been left. 6, Make superficial incision around cicatricial canal.

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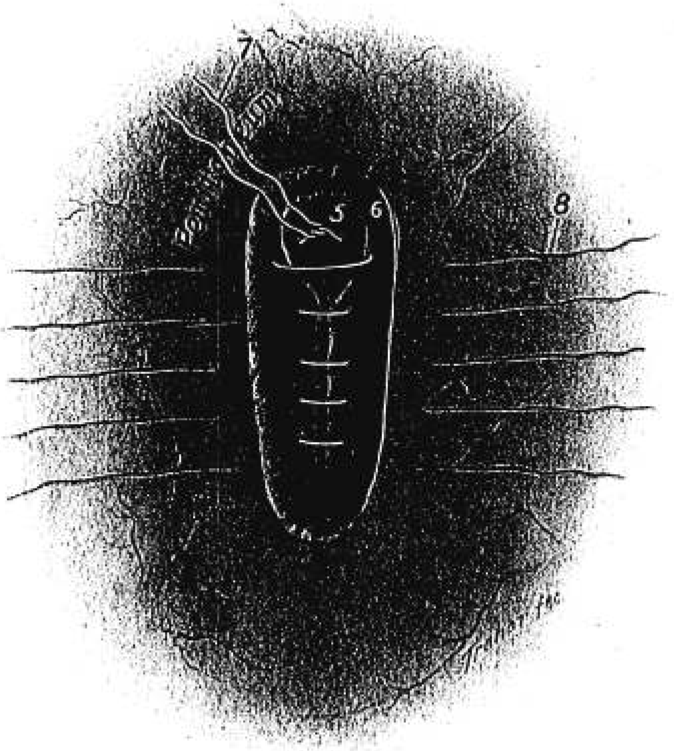
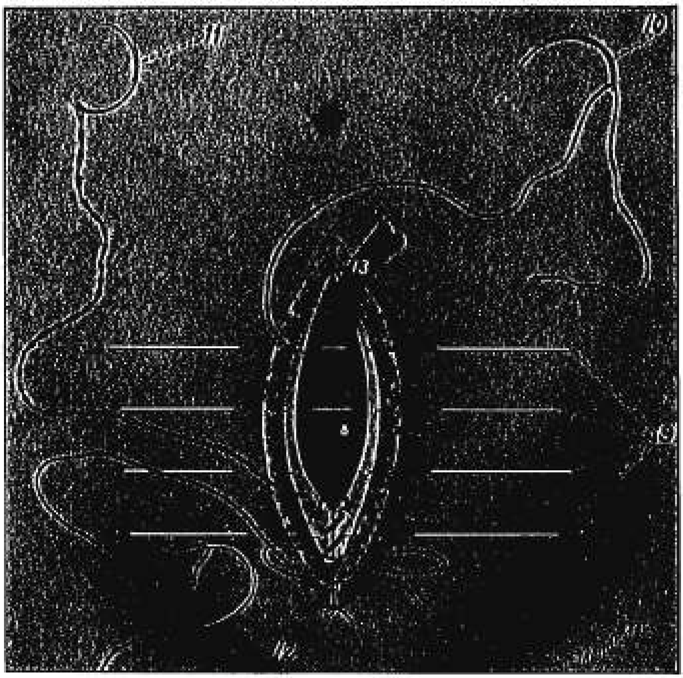
PLATE IV.



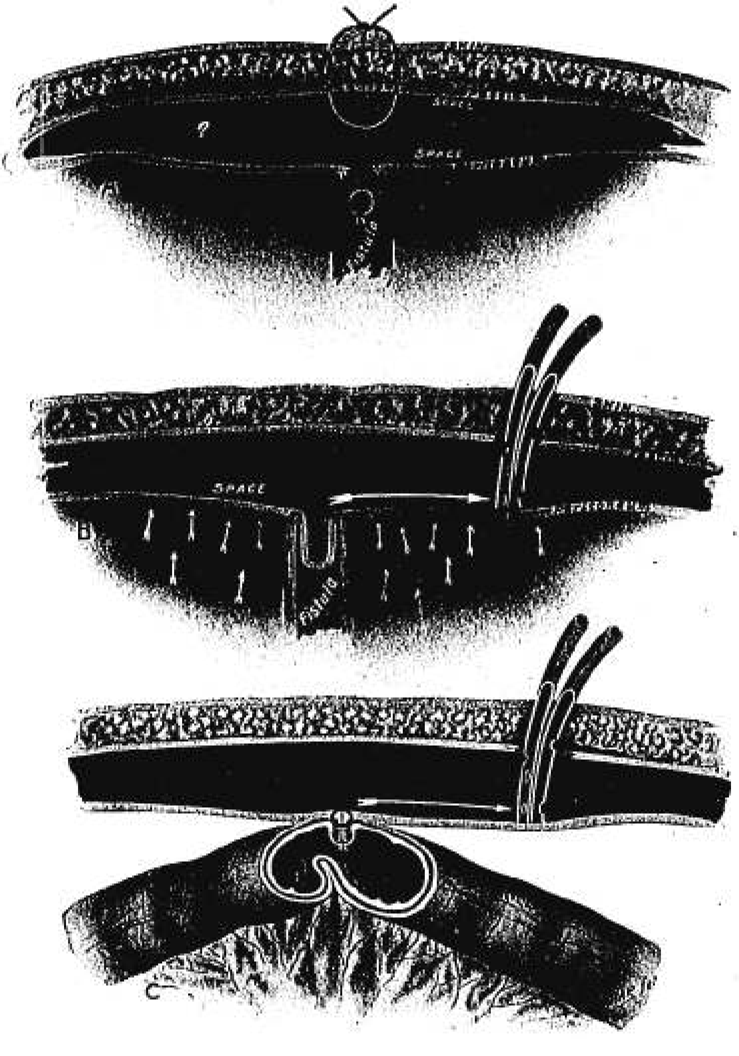
Closure of the fistula proper.—7, Turn in fistula proper with linen suture knotted on the inside after method of Connell. 8, Bring the raw edges of the cut together with catgut sutures, including connective and cicatricial tissue.

PLATE V.



Closure of the abdominal wall with layer sutures.—9, Silkworm gut sutures left untied. 10, Bring the muscular layer together loosely with catgut suture. 11, Suture fascia with heavy double catgut. 12, Suture the skin with button horse-hair suture. 13, Place drainage in the upper angle of the wound.

PLATE VI.



Diagrams showing sectional views to illustrate the mechanism of the suturing and drainage.—*A*, Transverse section through the fistula and layers of the abdominal wall. *B*, Longitudinal section in line of the incision shown in the previous picture. *C*, Result following closure of artificial anus.

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we have a purely surgical condition. This fistula is usually created for temporary drainage of the intestine, and the extent of the hernia depends upon the circumstances of the case. *D*, Plate I, at first sight, seems to represent an entirely different class of fistulæ. It is one in which a sinus leading through the abdominal wall communicates with an intestine located at some distance from the wall. Such fistulæ are usually found leading to some part of the more or less fixed colon. In the writer's observation most fistulæ of this type are found leading to the pelvic colon and, as a rule, have communicated with a pelvic abscess or are the results of tearing the rectum during pelvic operations. This type of fistula seems to be maintained by an obstruction which may be more or less physiological, in front or below the fistula. It seems that some of these fistulæ leading to the pelvic colon are maintained by the action of the sphincter ani. When the rectum attempts to expel its contents, the force is exerted partially through the anus and partially through the fistula, as by squeezing mush in the hand, forcing it between the fingers. In this class of fistulæ the expulsion of semi-solid fæcal matter may continue for months or even be permanent. We may admit that the majority of these fistulæ get well of themselves, but many of them do not, and many others persist for months longer than should be allowed. This form of fistula, in addition to the class just mentioned, may be maintained by a pathological obstruction such as a complete volvulus below the fistula, a malignant or tuberculous growth below the fistula (*F*, Plate I), a sloughing of a section of intestine which may be due to mesenteric embolism, etc. (*E*, Plate I). These fistulæ are the result of a distinct pathology which should be considered and named as the primary lesion. We may call this form conservative fistulæ. This variety can only be treated by intraperitoneal operation, and therefore does not come within the range of the subject under discussion.

I believe that forms *A, B, C, D*, of fistulæ shown in Plate I, are curable by extraperitoneal operation performed in the manner to be described later. Every surgeon of wide experience must look with a crtain amount of horror on an attempt to cure fæcal fistulæ by radical dissection and excision, for in this most surgeons have had an experience somewhat alike as regards mortality, if their experience covers sufficient number of cases. Makins found 38.4 per cent. mortality, Bryant in his latest text-book of surgery, just two years old, 28 per cent., Tillman 27 per cent. In fact, I think every surgeon finds that some of the most formidable experiences he has encountered have been in the attempt to dissect out deep seated fæcal fistulæ. It is no doubt true, however, that this mortality would be materially reduced by leaving out the conservative or essential fistulæ illustrated by *E* and *F*, Plate I. As a result of this formidable mortality various plastic operations have been devised and tried, but have been found wanting in the persistent cases, as is shown by the fact that in many of the most modern text-books not a single plastic operation has been described, the authors confining their descriptions to intraperitoneal operations. The best plastic operation and the one which has received the most recognition was described by Greig Smith a number of years ago. He reported splendid success with the operation, but subsequent operators have not been able to get as good results. He made a long incision, as is indicated in the operation herein described, keeping far away from the fistula until he reached the peritoneum, which was dissected loose from the muscle for two or three inches around so as to get room to draw the fistula well out of the wound, for convenience of manipulation. He apparently disregards the layers. The fistula was then excised, taking care not to open the peritoneum, and sewed up. Another layer of sutures was taken, turning in the outer side of the peritoneum still farther, and including the neighboring connective tissue. The intestine was then pushed back inside the abdominal wall and the wall closed by through and through stitches which, according to his original drawings, interlocked with the last stitch used in closing the fistula, which brought the intestine or the fistula in contact with the muscular wall. He recommended in certain cases, insertion of drainage down to the line of intestinal sutures. Owing to the fact that in these cases we are dealing with a septic field we are left to choose between the two horns of a dilemma in many cases. If we do not drain, the wall becomes infiltrated with septic or fæcal matter, which completely destroys our union; while if we drain, after the manner recommended by Smith, down to the line of sutures, we invite a return of the fistula which is again kept open in many cases by the same cause which kept it open before.

After studying the subject of fæcal fistulæ as it is given in the literature and as observed in a considerable number of personal cases, I have reached the conclusion that fæcal fistulæ, aside from the essential or conservative fistulæ which are due to an actual mechanical obstruction beyond the opening, such as a volvulus, or tubercular, or malignant process, persistent fæcal fistulæ are for all practical purposes the same as herniæ, and the treatment is exactly the same as for hernia, plus a special provision for drainage. If we should find a leak in a mill dam we would not attempt to repair it while the pond was full and running over the top of the dam, but would run the stream of water out through gates, over which we had control, until we had repaired the break in the dam. This, it seems to me, is the principle involved in the cure of fæcal fistula. The field is septic, therefore we cannot effect primary closure of the fistulous tract itself as a rule. We must, therefore, prepare to carry off this stream of fæcal matter through a channel which may afterwards be closed by natural forces while the break in the wall is being mended. If we drain directly we have the same fistula as when we started. In fact if we insert drainage in any direction so that it reaches the actual fistula, there is some danger of creating a cicatricial drainage tract which would be hard to close. In the study of this subject and its collaterals, I have reached two conclusions as to surgical principles.

First, There seems to be an irresistable tendency on the part of the peritoneum to cling to its abdominal wall. This is brought about by two forces: one is the normal resiliency of the hollow abdominal organs which is known as intra-abdominal pressure; the other is the great power of the subperitoneal connective tissue to hold the peritoneum in contact with the muscular walls of the abdomen loosely and yet persistently. If the uterus is attached to the loose peritoneum which has been detached from the wall, it is found in six or eight days that in what we left as open space there is an exudate which binds the peritoneum back to the abdominal wall and holds up the weight of the suspended organ. Six months later the exudate has disappeared and an excess of subperitoneal connective tissue has taken its place, holding the peritoneum more solidly to the wall than normal. The same holds good in suspension of the liver in which the organ has to be lifted upwards by the connective tissue.

Second, I have observed that in doing abdominal operations in which virulent sepsis was encountered, if sufficient drainage was inserted into the cavity and allowed to come out through the lower end of the wound, no matter how large the rest of the wound may be, by using layer sutures it can be closed in the presence of the sepsis with as full assurance of getting primary union as if it had been perfectly aseptic. The drainage takes place between the layers, thus protecting the sutures and closing the space as soon as the sepsis has been eliminated. Taking these observations as a basis, I have formulated the method of treating fæcal fistula shown below. If the fistula is discharging profusely it is well to first pack a strip of gauze into it, then take the following steps:

(1) Dissect out the old scar down to the fat and make an incision around the fistulous tract, including a small strip of skin, direct the point of the knife slightly away from the fistula so that it first comes in contact with the fascia about half an inch away from the fistula, in order to avoid any possibility of opening the peritoneum. (2) Dissect up the fat from the fascia for as much as two inches from the incision, draw it back, clean off the fascia. (3) Make an incision through the fascia, beginning at the upper end of the wound and coming toward the fistula. Dissect the fascia from the muscle for at least two inches in every direction. (4) Dissect the muscle from the peritoneum in the same manner so that the peritoneum hangs

loosely with the fistula standing up in its centre like a volcano and its crater. (5) The little margin of skin which has been left with the edge of the fistula is now trimmed off. (6) If the wall of the fistula is hard and cicatricial, making it difficult to turn in, it is well to make an incision part of the way through the cicatricial tissue so that it may be turned in easily. (7) The edges of the fistula are turned in with linen sutures which are knotted on the inside. (8) A second layer of sutures brings the edges of this incision and the connective tissue over the peritoneum along with the scar tissue, covering the turned in fistula, to add temporary strength and bulk to the closure. The peritoneum and the rest of the wound is now thoroughly mopped or irrigated with salt solution to make it as clean as possible. (9) silkworm gut sutures are passed through skin, fat, fascia and muscle about a half inch or more from the edge and left untied, space being left at the upper end of the wound for drainage. (10) Suture the muscle loosely with a continuous catgut. (11) Suture the fascia with a strong double catgut. (12) Suture the skin with a horse-hair button-hole stitch. (13 Place the drains, which may be tubes or cigarette drains. No matter which is used, I have been in the habit of placing two or three wicks of gauze along the side to help hold the drainage in and keep the opening patulous. A roll of gauze is laid on each side of the wound and silkworm gut sutures are tied over the gauze. *A*, Plate VI, shows a cross section through the fistula in which is represented all the different layers of sutures, all the different layers of the abdominal wall, and the spaces between the layers which have resulted from the dissection, and which are for the purpose of draining away septic materials from the sutures. The lateral spaces between the fat, fascia, and muscle serve as drainage channels to conduct any septic material or fluid around the line of sutures to the drain at the upper end of the wound, as shown in the next figure. The sutures are represented as interrupted sutures for purposes of illustration, but they are actually placed as shown in Plate V, namely, a series of continuous sutures.

*B*, Plate VI, represents a longitudinal section through the fistula which corresponds exactly to the principal incision in the abdominal wall as shown. This figure is made to represent the effect of sutures holding the various layers of the abdominal wall together, without actually showing the sutures. The large arrow going toward the drainage tubes represents the direction of drainage from the fistula. The small arrows show the direction of intra-abdominal pressure which gently but persistently forces the fluid in the direction of the drainage tubes. The two spaces above and below the fascia illustrate method by which the lateral spaces shown in Fig. *A* are brought in contact with the drainage. These two figures (*A* and *B*, Plate VI) illustrate the mechanism by which drainage is arranged to completely protect all the sutures. These sutures are allowed to remain for about two weeks before the horse hair and silkworm gut are removed. At the end of this time union in the abdominal walls should be perfect. In the meantime, any material which may have come from the fistula has been carried beneath the peritoneum and delivered to the surface through the opening at the point of drainage. In five out of the seven cases treated by this method the necessity of drainage was proven in that the fistula leaked about the fifth day, continuing from five days to three weeks. In the meantime new connective tissue is forming back of the peritoneum and is gradually closing off this space between the peritoneum and muscle, as was mentioned as being true in cases of ventro-suspension. The reformation of subperitoneal connective tissue seems almost irresistible.

*C*, Plate VI, represents the transverse closure of an artificial anus, in which the colon was brought to the surface and deliberately opened. It will be noted that the spur has not been entirely obliterated by the operation, but has been so reduced as to allow of passage of intestinal contents easily. The dissection in such a case is made in exactly the same manner as illustrated in the pictures. In such a case the spur may be obliterated partially by some of the well known methods of the Dupuytren type, or with the Murphy button, as has been used by Byrant, before the closure operation is performed, if it is so firm as to form an obstruction. This method of obliteration may also be necessary in cases of gangrenous loops of intestine in which part of the intestine has sloughed, leaving two parallel ends open. If the operator is fortunate enough to think of the cure of this artificial anus at the time he is drawing out the loop he may sew the intestines together for some distance, so that he can obliterate the septum without any danger. After this septum has been obliterated it is a very easy matter to close the fistula by the method which has been described.

The variety of fistula as shown in *D,* Plate I, has been used as the basis of our illustration for three reasons. First, I happened to have a case of this variety at the time the pictures were being made. Second, It is one of the most difficult and serious varieties to close by an intraperitoneal operation. Third, It is located in the linea-alba where the layers of the abdominal walls are simple, making the operation easy to illustrate.

The same method, however, is applicable at any point of the abdominal wall, always remembering that every layer must be dissected up for some distance away, and that each must be sutured separately. It may not be essential, but I feel it is better suturing to enclose all the layers in one deep silkworm gut suture, as shown by this picture. The drainage is removed in one week after the operation and wound is not repacked.

Since beginning to use this method I have closed seven consecutive fæcal fistulæ, of from four months to two years standing, without a single failure or without a single stitch infection,* while similar cases prior to the time I began to use it were not treated successfully by plastic operation in all cases, and in the deep fistula in which I attempted to do a radical excision I found serious complications and large mortality.

In all cases of fæcal fistula represented by Types *A, B, C, D,* Plate I, I would begin with almost absolute assurance of being able to close them without opening the peritoneal cavity. Of course in cases represented in *E* and *F* no plastic operation is of value, as the fistula is not the real pathology.

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* Since this paper was sent to the publisher the last patient operated on by this method writes that some time after she left the hospital something like a blister appeared at the lower end of the incision, followed by a slight discharge of serum and then healed again, but the same process has beeen repeated at intervals since. She states that her doctor thinks there is a stitch at the bottom of it.